THE PHILIPPINE ISLANDS

VEGETABLE AND ESSENTIAL OILS

in the

PANAMA PACIFIC INTERNATIONAL EXPOSITION SN. FRANCISCO CALIFORNIA

VEGETABLE AND ESSENTIAL OILS

VEGETABLE OILS

PLANTS with oil-bearing seeds are widely distributed. Of those growing in warmer climates the coconut is probably the most important.

Coconut.—The growing of the coconut as an industry in the Tropics is arousing more interest every year. The Philippines, while now among the leading coconut (copra) producers of the world, are capable of almost indefinite expansion in this regard. The methods of handling and disposing of the product need improvement, however, while the extraction of the oil in the Philippines, rather than exportation of the raw material, should be extended. There is no question but that the coconut industry in the Philippines offers one of the most attractive fields for capital now available.

The amount of copra exported during the past ten years is as follows:

Copra exported from the Philippine Islands

[Values in U. S. currency.]

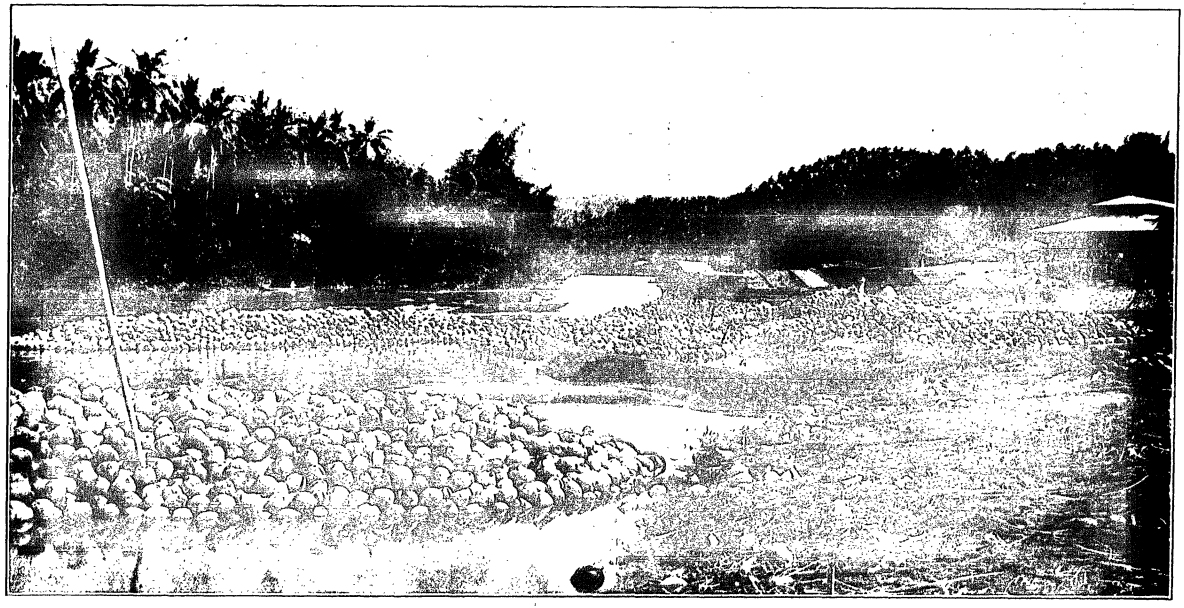
Fiscal year.	Quantity.	Value.	Average value per ton.	Percentage of total export.
	Met. tons.	*Dollars.*	*Dollars.*	
1904	54,133	2,527,019	46.68	7.0
1905	37,557	2,095,352	55.79	5.6
1906	66,158	4,043,115	61.11	12.3
1907	49,082	4,053,193	82.58	11.8
1908	76,420	5,461,680	71.47	16.6
1909	105,565	6,657,740	63.07	21.1
1910	115,285	9,153,951	79.40	22.9
1911	115,602	9,899,457	85.63	24.9
1912	169,342	16,514,749	97.52	32.8
1913	113,055	11,647,898	103.03	21.9

During the last three months of the fiscal year 1913 there were exported 1,302,275 kilograms of coconut oil valued at $312,513. This represents the oil from approximately 2,200 metric tons of copra. This raw copra, at $103.03 per metric ton, would have been worth $226,666, so that the manufacturers received more than $85,000 for the cost of production and profits, while the press cake could be disposed of at a fair price. Coconut oil has an extended use as an edible oil, in the manufacture of soap, etc.

Castor oil.—The castor-oil plant grows readily in all parts of the Philippine Archipelago, occurring as a weed in waste places. At present there is no attempt to make use of it commercially. However, when one considers the many uses for castor oil, the cultivation of the plant suggests great industrial possibilities.

The plant grows luxuriantly and produces abundantly under natural conditions. Any initial outlay in milling machinery would be unnecessary, as the product can be worked up in a coconut-oil mill. We are nearer to the Australian market than is British India, from whence the Australian supply of castor oil is brought. The development of the industry here could supply that market, as well as the increasing demands of America.

Lumbang bato and lumbang banucalag nuts.—Both lumbang bato and lumbang banucalag belong to the genus *Aleurites,* as does the wood or tung oil nut of China. The nut known locally as lumbang bato is identical with the kukui nut of the Hawaiian Islands, and is known generally as the candle nut. The lumbang banucalag nut is very similar to the candle nut, but possesses a softer shell and would be easier to work. They both yield drying oils of fine quality, superior to linseed oil in rate of drying. The trees which produce these nuts are well distributed over the Islands, and their cultivation should



Rafts of coconuts.

become a profitable industry, as they grow quickly, bear early, and have no known enemies.

The lumbang bato nut yields from 60 to 65 per cent, based on the kernel, of a light-yellow oil when extracted with a solvent. Lumbang banucalag yields somewhat less than 60 per cent under the same conditions. Neither has the peculiar odor characteristic of tung oil on drying. At present practically all the oil used is prepared and marketed in Manila. There are only a few places where oil is being expressed, and the presses used are of the crudest description. This oil sells at 50 cents per gallon.

Palo maria nut.—Palo maria nut oil, improperly called laurel nut oil in Indo-English, grows native in the Philippine Islands. It cannot be used as an edible oil owing to a poisonous resin contained in it. It is sold in Europe under the name of "udiloöl" as a remedy for rheumatism and skin diseases. At present it sells for several times the price of castor oil in Burma. The kernels on extraction yield from 70 to 75 per cent of a greenish yellow oil.

Kapok seed.—The cotton tree, which furnishes the fiber used commercially for upholstering, under the Malayan name "kapok," is exceedingly common in all parts of the Philippines. The fruit is a spindle-shaped pod from 4 to 5 inches long. It is filled with black seeds embedded in fine silky hairs. In Java the seed hairs are used for stuffing mattresses, sofas, and similar articles. In Manila they are being used with excellent results for insulation. The ground seeds extracted with petroleum ether yield 25 per cent of a bland edible oil.

Cashew nut.—The cashew nut tree grows readily throughout the Archipelago. It was introduced here from tropical America. The nut is a large pear-shaped fruit, and contains a brown, kidney-shaped seed attached to one end of the fleshy part. Both the fruit and nut are edible, the latter, when

roasted, having a very agreeable taste. The expressed kernel yields a sweet, yellowish edible oil.

Physic nut.—The physic nut was introduced from Mexico. It yields from 30 to 40 per cent of a yellowish oil with a faint, peculiar odor and a bland, nutty taste. It belongs to the semidrying oils, and is employed in the manufacture of soaps and candles; it also has some use as a lubricant and as a medicine. The plant is very abundant in the settled areas of the Philippines.

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ESSENTIAL OILS

Tropical or semitropical countries are the natural homes of the essential oil producing plants. Among these countries the Philippine Islands occupy a high position. This rank bids fair to greatly increase with the development of the present known plants, the discovery of new species native to the Islands,

Ylang-ylang.

and the introduction of those already well known elsewhere.

Ylang-ylang.—Ylang-ylang is undoubtedly the best-known essential oil produced in the Philippines. This oil has a large sale in Germany and France as perfumery stock. The Philippine product and that from Réunion are considered standard by buyers. The quantity and value of ylang-ylang oil ex-

ported from the Philippine Islands during the last five years is as follows:

Ylang-ylang oil exported from the Philippine Islands

Year.	Amount.	Total value.
	Kilos.	*Dollars.*
1909	2,812	87,936
1910	1,878	58,334
1911	1,684	47,404
1912	2,785	80,879
1913	2,172	58,309

With the more general introduction of improved methods of collecting flowers, and installation of modern machinery for the extraction of the oil, a large increase in the foreign sales may be expected.

Champaca.—The champaca flower is considered by experts to produce the finest perfume of any of the flowers of the Philippines. This flower contains approximately 0.2 per cent of oil, while the ylang-ylang flowers yield from two to three times this amount, but the champaca oil sells at a much higher price. As the trees begin bearing flowers while young, and the market for the oil is active, the extraction of champaca oil promises to become an important industry.

Ginger.—The ginger plant is cultivated to a limited extent in all parts of the Islands and yields a good supply of oil.

Calomata.—The leaves of *Glausena anisum-olens* (Blanco) Merr., which is rather abundant in some parts of the Philippines, yield an oil having an odor of anise. It is used locally as a flavor for beverages. Schimmel & Co.'s Semiannual Report, 1914, states that the supply of anise oil stock is very unsatisfactory. This would warrant hopes for the introduction on the market of a good substitute.

Lemon grass.—Lemon grass oil as a source of

citral can be produced profitably here, owing to the cheapness of labor. It has been calculated that 1 acre of land would give an annual yield of 25 pounds. Due partially to the expiration of the ionone patents, the price of lemon grass oil has advanced. The

Champaca.

annual production of this oil now exceeds a quarter of a million pounds. The Philippines have no part in this, though they are by nature well adapted to produce lemon grass oil profitably.

Cinnamon.—With regard to cinnamon, Schimmel & Co.'s Semiannual Report, 1914, states: "The prices

of the raw material have remained firm and the demand increased to such an extent in the course of the winter, that our factory was at times unable to keep pace with it;" and again, "The situation of the article is such that lower prices are not to be expected in the near future." The cinnamon tree occurs in the Davao district of Mindanao, and offers a good opportunity for development.

Vetiver.—Vetiver oil is obtained from *Andropogonzizanioides* Urb. (*A. squarrosus* L. f.) a grass which is found abundantly in all parts of the Archipelago. As this oil sells at from $50 to $100 per kilogram (2.2 pounds) in Europe, the distillation of the native plant would be profitable. The exportation of the dried roots to Europe also offers possibilities.

Citrus.—At present the orange, lime, and pomelo are all sold in the local market for home consumption, but this industry could be increased to such an extent that these fruits would be available for bottling purposes and for the preparation of oil. The oil corresponds favorably in quantity and quality with other citrus oils obtainable in other parts of the world. There are distinct possibilities in the distillation of the oil from the leaves of some forms.

Blumea balsamifera DC.—*Blumea balsamifera* grows abundantly in all parts of the Islands. It yields from 0.1 to 0.4 per cent of yellow oil with a camphorlike odor, consisting of almost pure 1-borneol. As 1-borneol can be oxidixed very readily to camphor, the oil should have a commercial value. The growth of the plant is exceedingly vigorous, and the leaves could be cut four times a year.

Balao resin.—Balao resin coming from a tree of the Islands is chiefly used at present in the varnishing and caulking of native boats. It gives a very brilliant, tough, and durable coat, but has the disadvantage of drying somewhat slowly. As this resin

does not belong to the fossil resins, the supply would be permanent.

Manila elemi.—Manila elemi flows from the bark of *Canarium luzonicum* chiefly at the time when new leaves are coming out. The Filipinos hack the tree with a bolo to cause the flow. Healthy mature trees will average from 8 to 11 pounds of resin per year, although large trees will sometimes yield much more. The total world production is not large, and as the greater part comes from the Philippines it is known as Manila elemi. It is used medicinally in the preparation of ointments and plasters, and has a somewhat limited use at present in the manufacture of lacs and varnishes for imparting toughness. Recently it has come into use in the preparation of lithographic inks.

Pitch seed.—Pitch seed is the product of *Pittosporum,* several species of which occur in the Philippine Islands. Even when green the fruits burn very readily. They are interesting scientifically, because they contain considerable quantities of normal heptane. This paraffin oil occurs also in the digger pine of California, the only other instance known.

Cassie.—Cassie is a spiny shrub (*Acacia farnesiana*) with heads of fragrant yellow flowers; it is very abundant in many parts of the Philippine Islands. This plant is extensively utilized in southern France, but is not utilized at present in the Philippine Islands.

OTHER POSSIBLE SOURCES OF ESSENTIAL OILS

The plants named below are very promising when considered from the standpoint of essential oils: *Gardenia, Clausena,* "dama de noche" (*Cestrum*), "camia" (*Hedychium*), *Ocimum, Coleus amboinicus, Limnophila manilensis, Piper* spp., *Cleome viscosa, Mallotus floribundus,* papaya (flowers), *Lawsonia inermis, Aglia odorata, Quisqualis indica, Jasminum sambac, Plumeria alba,* and other species.

The Islands are thus seen to have a promising future from the standpoint of essential oil bearing plants both on account of favorable climatic conditions, and because of a plentiful labor supply.

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